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Comments:

From the SCS Chief

Jobs Act Funds Speed Conservation Work

The 1983 Jobs Act (Public Law 98-8) will help complete conservation projects faster, save more soil and water, and give more local people meaningful work.

The Act provided $112.5 million to SCS for watershed and flood prevention operations, emergency measures to repair flood damages, and Resource Conservation and Development measures. Many of these activities have been planned for some time but were scheduled for construction in later years.

SCS State and field offices helped select the measures for accelerated action based on local unemployment rates, number of jobs that would result, and how quickly people could be put to work.

Nearly 200 projects in 41 States have been selected for quick action. The funds are not intended to add permanent SCS employees. We will hire contractors, including small business and minority contractors, who will in turn employ local people.

Of the SCS funds received, $100 million is earmarked for small watershed and upstream flood prevention operations, one of our highest priority objectives. I'm encouraged that this money is dedicated to soil and water conservation. We will need to keep the public advised about the work that conservation districts and other local groups accomplish with this fresh incentive to create jobs by accelerating needed conservation work.

Cover: Construction of flood control structures in small watershed projects will be accelerated by Jobs Act funding. Funds are also slated for emergency watershed protection and Resource Conservation and Development measures. See Comments From the SCS Chief, above.

John R. Block
Secretary of Agriculture

Peter C. Myers, Chief
Soil Conservation Service

All programs of the U.S. Department of Agriculture are available to everyone without regard to race, creed, color, sex, age, or national origin.

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News Briefs

SCS Updates Status Map of Important Farmland Mapping

The Soil Conservation Service is responsible in the U.S. Department of Agriculture for inventorying the Nation's prime agricultural producing areas. Recently, SCS published an updated map showing the status of important farmland mapping in the United States.

The map shows the 836 counties which had published important farmland maps by January 1, 1983, and the 387 counties which had mapping in progress. Three States have published maps for all of their counties—Delaware, Rhode Island, and Oklahoma.

The important farmland maps identify prime and unique farmlands and farmlands of statewide and local importance. Officials, planners, and other citizens use the maps in their efforts to retain farmland in developing areas and to restore farmland productivity after land-disturbing activities such as surface mining. The maps are also used in assessing the possible environmental effects of Federal projects on prime farmland.

States select counties for the important farmland maps based on need. High priority are those counties experiencing rapid land use change and possessing rich coal reserves. Another consideration is the impact that a change in prime farmland use will have on the local economy and well-being. Before an important farmland map can be made for a county, the county must have an up-to-date detailed soil survey.

Copies of the map of the status of important farmland mapping nationwide can be obtained from any SCS State office.

Nancy M. Garlitz,
associate editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

Conservation District Inaugurates No-Interest Loan Program

The Rosebud Conservation District in eastern Montana initiated a no-interest loan program this year to help finance county soil and water conservation projects. According to Dennis Kenney, conservation district chairman, the Rosebud District's program is the first county conservation loan program in the State.

The district supervisors are offering $10,000 or $20,000 loans with a 5- and 10-year payback respectively. Although there will be no interest on the loans, the district charges a 3-percent closing and administration fee.

The district is funded by a 1½ mill tax on real property, land, and building improvements within the county. The 1½ mill levy is the maximum Montana conservation districts are allowed to receive under State law.

By March, 12 landowners had applied for the $100,000 being offered this year. Agricultural producers in the district who have conservation plans are eligible for the loans, according to Kenney. The district supervisors determine whether an individual will receive loan funds based on a need and feasibility determination by the Soil Conservation Service.

The conservation district is using the loan program as one way to achieve the goals in its long range plan, which include increasing irrigation efficiency and reducing weed problems by converting open ditches to pipelines and by reducing canal and supply ditch seepage.

Once the loan fund reaches $500,000, which may take 3 years, the supervisors intend to reduce the funding request from the county to ¼ or ½ mill.

Dennis Loreth,
district conservationist, SCS, Forsyth, Mont.

Soil Conservation Districts Give Planter to Researchers

When seven soil conservation districts in northwest Iowa learned that the budget for equipment was limiting no-till and till-plant research in their area, they seized the opportunity to help out.

They purchased a planter, and donated it to Iowa State University (ISU) for research use. "We wanted to see more research on our Galva, Primghar, and Sac soils, and thought the planter could be put to good use at the Sutherland and Doon Research Farms," says Doyle Wilson, chairman of the O'Brien County Soil Conservation District.

Wilson presented the planter to ISU Agriculture Experiment Station Associate Dean John Mahlstede in a special ceremony in April. Soil conservation districts who raised money for the planter include: O'Brien, Plymouth, Osceola, Lyon, Clay, Dickinson, and Cherokee.

"This is a first in Iowa as far as soil conservation districts go," Wilson says. "We decided to get going on it last fall, had a couple of meetings to determine interest, and got the planter."

The four-row planter is equipped with fluted and ripple colters, liquid fertilizer attachments, and trash whippers. Rick Kruse, an assistant professor of agronomy at ISU, says fertilizer placement, effects of ridging, and effects of starter fertilizer are among the research ideas being considered for this year.

At the presentation ceremony, Iowa Department of Soil Conservation Director Jim Gulliford praised the districts for determining a need and following through as part of a solution. Soil Conservation Service State Conservationist William Brune, also praised the districts and pledged to work with the Extension Service in relaying research results to farmers.

Marvin Larson,
district conservationist, SCS, Primghar, Iowa

International Memorandum Signed to Control Saline Seep

Montana Governor Ted Schwinden and E. L. Fjordbotten, minister of agriculture, Alberta, Canada, recently signed an international memorandum of understanding promoting joint work on the saline seep problem in Montana and Alberta. The memorandum permits the governments of Montana and Alberta to combine and share research efforts in the battle to control seep.

The document was also signed by Leo Berry, director of the Montana Department of Natural Resources; Herb Pasha, chairman of Triangle Conservation District; and Bill Norris, a representative of the salinity control association of Warner, Alberta.

Saline seeps, or salty areas on nonirrigated cropland, have affected about 2 million acres of dry cropland in the northern Great Plains—parts of Montana, Wyoming, North and South Dakota, and Canada.

Officials estimate that 280,000 acres of once productive dry cropland are now affected by saline seep in Montana; Alberta has approximately 500,000 affected acres.

Alberta's interest in the Triangle Conservation District's saline seep control program prompted the memorandum of understanding. The Triangle Conservation District, organized and funded in 1979 through a grant from the Montana Department of Natural Resources and Conservation, has been working with farmers and ranchers in the nine-county area north of Great Falls to combat the saline seep problem. The success of this program in reclaiming saline seep areas in Montana attracted the interest of officials in Alberta.

Ted Dodge,
team leader, Triangle Conservation District, Conrad, Mont.

SCS Maps Used in Search Mission

Maps used routinely in the Soil Conservation Service have again proved useful to the Vermont State police as an aid in search and rescue missions. On Sunday, last November 14, the second day of deer season, Stan Counter, SCS technician in the Middlebury field office, was contacted at his home to assist in a search for a hunter lost in the remote region of Starksboro. Counter brought SCS aerial photography maps, which were used to grid the search area to insure that no sites were overlooked. Shortly after Counter arrived, the missing hunter was found dead. The 22-year-old father of two had been shot in the head, presumably by another hunter.

Monday, following the accident, a State trooper went to the field office to express thanks for Counter's help and to obtain names and telephone numbers of the other employees in case their help was needed in the future.

This was the second time that SCS aerial photographs have helped find missing persons in Vermont. In September 1980, a missing 4-year-old boy was found unharmed in a wooded area of Calais. (See article in the January 1981 issue of *Soil and Water Conservation News*.)

Robert E. Collins,
district conservationist, SCS, Middlebury, Vt

Indiana Studies Effects of No-Till on Wildlife

The Soil Conservation Service and the Indiana Department of Natural Resources are cooperating in a 3-year study to examine the effects of no-till farming on the State's wildlife population. Field trials will provide information on cover crops, technical aspects of conservation tillage, and the effects of no-till farming on small bird and mammal populations.

Plant Collection Presented to Hopi Tribe

The Flagstaff, Ariz., Soil Survey Office has made a collection of 140 plants on the Hopi Indian Reservation. It consists of 28 grasses, 71 forbs, and 41 shrubs. The plants were identified by common plant name, scientific name, and, where possible, with the Hopi name. A set of this plant collection has been presented to the Hopi Tribe to advance their understanding of soils and plants used to solve conservation problems.

New Plow Shows Conservation Benefits

A new plow which appears to have some soil conservation advantages over chisel plows and sweeps will soon be available to farmers in the United States. The company in England who developed the implement calls it the paraplow.

The paraplow has wing-like blades set at 45-degree angles to the soil surface. Paraplows come with from three to six shanks that can be adjusted to depths of 9 to 14 inches and can leave 95 percent of crop residues on the surface. The new plows have been tested at Ohio State University in Columbus and have been demonstrated in the Midwest.

Similar to sweeps, the paraplow lifts the soil and shatters it. The developers of the plow say that it cracks the soil along natural lines and improves the infiltration of water by producing channels that line up with channels in the subsoil. Some of the research done at Ohio State University indicates that the infiltration rate was higher where the paraplow was used than with chisels, sweeps, or moldboard plows.

Paraplow developers also say that the blade on these new plows rubs against the soil layer beneath the loosened soil for only about 1 inch of every 20 inches plowed. This makes the paraplow less likely to cause a plowpan, or impermeable layer, to form.

Gerald Darby, national agronomist for the Soil Conservation Service in Washington, D.C., said, "The paraplow appears to have some advantages for stubble mulch conservation tillage systems in subhumid areas of the Great Plains where plowpan formation is a problem. The paraplow also leaves more residue on the soil surface.

"In the northern Corn Belt where tillage is necessary to prepare a seedbed in the fall, the paraplow could be used to leave more residue on the soil surface," Darby said. "The new plow may also have an advantage in areas where no-till and other types of conservation tillage have not performed well because of poor soil conditions."

According to Darby, SCS is viewing the paraplow with "optimistic skepticism." He said that it appears to have benefits in certain areas.

Nancy M. Garlitz,
associate editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

Call for Papers

The Agricultural History Society, the University of Missouri-Columbia, and the Soil Conservation Service announce a symposium on the history of soil and water conservation at Columbia, Mo., May 24-26, 1984. Susan Flader of the university and Douglas Helms of SCS are the symposium coordinators. Please submit proposals and requests for information to Douglas Helms, Historian, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, D.C. 20013, by September 10, 1983.

RCA Update

Secretary of Agriculture John R. Block has ordered the implementation of the National Program for Soil and Water Conservation. The program, developed under terms of the Soil and Water Resources Conservation Act of 1977, was transmitted by the President to Congress on December 21, 1982.

Eight U.S. Department of Agriculture (USDA) agencies—Agricultural Research Service, Agricultural Stabilization and Conservation Service, Cooperative State Research Service, Economic Research Service, Extension Service, Farmers Home Administration, Forest Service, and Soil Conservation Service—administer programs of soil and water conservation. Accordingly, the Secretary established a task force of the heads of these eight agencies and charged them with program implementation.

In his charge to the agency heads, Secretary Block said, "I have made conservation one of my top priorities as Secretary. We must have a strong conservation program or we will not have a prosperous agriculture in future generations. . . .We are foresighted enough to know that our long-term agricultural productive capability has to be maintained."

The first assignment of the task force is to prepare a draft plan and program implementation schedule. The draft plan will describe the implementation process and identify policy issues that need the Secretary's attention.

In mid-May, the task force reviewed status reports detailing progress already made in implementing the following features of the program: Targeting Soil Conservation Service conservation technical assistance and Agricultural Stabilization and Conservation Service financial assistance through the Agricultural Conservation Program; conducting pilot projects to test new conservation methods; and improving USDA interagency cooperation and budget coordination. Progress updates will be sent periodically to the task force.

The task force is chaired by John B. Crowell, Jr., Assistant Secretary of Agriculture for Natural Resources and Environment. Peter M. Tidd, Director of the Appraisal and Program Development Division for the Soil Conservation Service, is executive secretary to the task force.

James N. Benson,
public affairs specialist, Public Information, SCS, Washington, D.C.

Iowa Farmer Favors No-Till License Plates

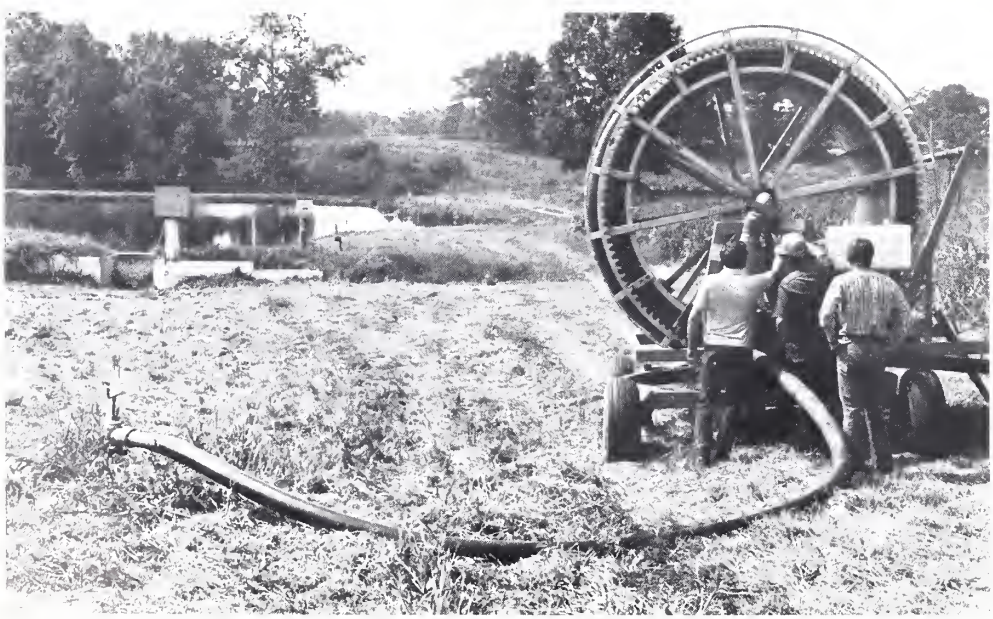
West Branch, Iowa, farmer Wayne Frederick likes no-till so much he's using his license plates to drive the point home to neighbors and others. Frederick, a former soil scientist for the Soil Conservation Service, has about 15 years' experience with no-till farming. He consistently grows corn with yields between 150 and 200 bushels an acre. He's been a featured speaker at no-till meetings throughout Iowa for several years, and is one of many Iowa farmers who maintains that no-till is the best way to farm.

Photo by Dave White, district conservationist, SCS, Tipton, Iowa

No-Till Makes the Grade

by Donald L. Comis

At right, Buddy Atkins, Extension Specialist at North Carolina State University, inspects a flume he used to monitor runoff at the Choplin farm. Data collected at the edge of the Choplins' 18-acre field of no-till milo in grain stubble show that no-till, as part of a complete conservation system, was 99 percent effective in stopping erosion.



Below, Atkins, farmer Huel Choplin, and SCS District Conservationist Bobby Brock (right to left) check Choplin's traveling irrigation gun. The flume is in the left background.

A May 1982 rainstorm in Wake County, N.C., gave no-till a grade of 99 percent. That's how effective no-till, combined with other practices, was in stopping sediment from leaving a field monitored by scientists. The storm removed only 3 pounds of soil from an 18-acre field of no-till milo in grain stubble while the same storm carried off 34,000 pounds of soil from a 10-acre field of continuous soybeans on a nearby farm without conservation.

North Carolina's erosion rate is the eighth highest in the Nation, with an average annual soil loss of 7.6 tons per acre. This includes the Coastal Plain area of the State, which has a low erosion rate. This is in contrast to the Piedmont, which includes Wake County, where annual erosion rates can reach 25 to 30 tons per acre. On the average, approximately 40 million tons of soil erodes from North Carolina's cropland annually. Some of this washes into rivers, lakes, and estuaries as sediment and can carry pesticides, nutrients, and animal waste, which can result in serious water quality problems.

The two fields being studied are part of a Wake County demonstration project designed by the North Carolina Non-Point Source Agricultural Task Force to show how "Best Management Practices" (BMP's) can protect water quality while also increasing onfarm efficiency.

The North Carolina Soil and Water Conservation Commission coordinates the task force, which includes representatives of the North Carolina Farm Bureau; the North Carolina Grange; the North Carolina Department of Agriculture; North Carolina State University (Extension and Research); and USDA's Agricultural Stabilization and Conservation Service (ASCS) and Soil Conservation Service.

The task force chose a well-managed, 100-acre Wake County farm owned by Huel Choplin and his son Connie as the model BMP farm and also a minimally managed nearby farm for comparison. Both farms have rolling topography and sandy loam soils with slopes up to 10 percent, which are typical of much of the farmland in the North Carolina Piedmont. On the control farm, continuous soybeans

are grown straight up and down the slopes. On the model farm, the Choplins grow feed grains for their 100-sow, farrow-to-finish swine operation.

On both farms, Buddy Atkins, Extension Specialist in the Biological and Agricultural Engineering Department at North Carolina State University, studies storm runoff as it passes through a flume at the edge of each field. Based on data collected in 1982, the per-acre losses on the minimally managed field were: 176,000 gallons (6.5 inches) of water; 14.7 tons of sediment; 1,370 pounds of organic material (measured as chemical oxygen demand); 38.2 pounds of total nitrogen; and 12.6 pounds of total phosphorus. The per-acre losses from the model field were: 93,000 gallons of water (3.4 inches); 0.05 ton of sediment; 82.1 pounds of organic material (measured as chemical oxygen demand); 7.8 pounds of total nitrogen; and 2.4 pounds of total phosphorus.

These figures provide a rare documentation—under actual farming conditions—of the tremendous resource savings possible with no-till as part of a complete conservation system.

The Choplins disk in the fall before planting winter cover crops such as wheat and barley. In the spring, they plant milo directly into the stubble of the winter crops using no-till. The Choplins combine conservation tillage into their complete conservation system, which includes many other practices, such as contour farming, parallel terraces, grassed waterways, field borders, and ponds. They also test their soil to assess nutrient and liming needs as well as their hog manure to determine its nutrient value. With this information, they can know the exact amount of manure needed to meet crop and soil nutrient requirements. The hog manure is stored in a liquid slurry pit before application with their traveling gun irrigation system.

These BMP's complement each other, saving the Choplins time, fuel, and money as well as helping keep North Carolina's water clean. For example, in 1982, the Choplins earned a $60 bonus from conservation by selling two crops of hay from their 5 acres of grassed waterways. More remarkably, from 1981 to 1982, they saved $8,000 on their annual fertilizer bill just through proper manure management. And by switching from continuous corn to small grain doublecropped with milo, the Choplins figure they get more protein per acre for their hogs, which is their goal.

The Choplins have had excellent yields of no-till milo, up to 6,665 pounds per acre. Corn yields have also been high with a 1981 top yield of just under 214 bushels per acre, which was far above the State average of 77 bushels per acre. Atkins says the credit for this success belongs to the Choplins for having a progressive attitude about conservation and environmental quality, understanding the benefits of good management on their farm, and thinking ahead rather than just thinking about short-term gain.

Farmers such as Huel and Connie Choplin give government agencies the chance to work with each other and the farmers to apply the solutions they know will work. Bobby Brock, then SCS district conservationist and now SCS conservation agronomist for North Carolina, helped the Choplins develop a conservation plan, as cooperators with the Wake Soil and Water Conservation District. ASCS paid part of their costs with special Agricultural Conservation Program funds as part of a 3-year, long-term agreement. Wake County extension agents provided information on weed management, irrigation scheduling, and fertilizer application while Atkins monitored the runoff and worked with the Choplins on their manure management.

One of the Choplins' secrets is that "bigger is not always better." Huel Choplin says he and Connie used to rent about 200 more acres scattered throughout northern Wake County and one day decided to stop "trying to farm the whole northern county." They had spread themselves so thin trying to increase production to feed their hogs, that there was no time or incentive to manage the rented land properly. Eventually, they drew back to their home farm, keeping very little rented land, and increased their yields per acre with improved management.

Now they have more time to calculate new ways to grow better crops at even lower costs. The result of their management is a beautiful, efficient farming operation and a cleaner environment for all North Carolinians.

Donald L. Comis,
assistant editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

Buddy Atkins (left) shows early results of his runoff study to farmer Huel Choplin. Choplin and his son Connie have had excellent yields of no-till milo, up to 6,665 pounds per acre. Their corn yields have also been high, 214 bushels per acre in 1981 compared to the State average of 77 bushels per acre.

Flood Protection Leads to Ground Water Recharge

by Homer H. Logan

In west Texas, Soil Conservation Service specialists have designed floodwater disposal wells to drain flood control reservoirs and recharge ground water aquifers. Flooding in Dell Valley, Tex.—which is located in the Salt Basin about 100 miles east of El Paso—results from the torrential summer thunderstorms that account for most of the 8 to 10 inches of rainfall the area receives each year.

These storms send runoff flowing across the basin to the valley floor, where it crosses fertile farmlands before it reaches the salt flats at the eastern edge of the valley. One storm, in August 1966, dumped 12 inches of rain in parts of the watershed, causing more than $4 million in flood damages and temporarily restoring the salt flats to lakes.

Even minor storm runoff results in some damage, mostly on the perimeter of the valley where the streams deposit coarse sediment when their energy is dissipated as they spill onto the valley floor. The waters from these minor storms do not flow very far before they are absorbed into the permeable surface of the valley. For this reason, channels to the salt flats are nonexistent, and large flows resulting from major storms spread themselves out as overland flow, wreaking widespread damage in the process. The mouths of the intermittent stream beds are up to 7 miles from the salt flats.

In the late sixties, as part of two Public Law 566 small watershed projects—the Hitson, C&L, and Washburn Draws watershed project and the Cornudas, North, and Culp Draws watershed project—SCS engineers planned to build flood control reservoirs in each of the draws. But how could the proposed reservoirs be drained if there were no channels downstream? Excavating and maintaining miles of channel were out of the question. The idea of floodwater disposal wells was born.

Certainly it had to be feasible, because agriculture is totally supported by high yield irrigation wells throughout the 40,000 acres being cultivated in the valley. Valley farmers grow cotton, grain sorghum, alfalfa, tomatoes, cantaloups, peppers, onions, and recently, on an experimental basis, grapes. And their wells draw water from fractures, cavities, and probably caverns in the marine limestone which underlies west Texas and southeast New Mexico to a depth of several thousand feet.

The plan called for the floodwater disposal wells to be drilled into exposed limestone bedrock on the western valley floor. The wells had to be immediately downstream from each proposed reservoir, to facilitate maintenance of the wells during the flood season and provide grade for the gravitational delivery of water to the wells. It would also be advantageous to locate the wells where they would intercept a number of natural fractures if possible, because these fractures within the rock control the primary movement of water in the limestone.

In 1979, SCS employed an expert from Pennsylvania State University to select sites for drilling. When the necessary easements were obtained for two of the Texas dam sites, SCS hired a contractor to drill five 20-inch-diameter wells to a depth of at least 1,200 feet, three downstream from the proposed dam in the Cornudas Draw and two downstream from the now completed dam in the C&L Draw. The wells are apparently capable of receiving large quantities of water because they produced from 1,200 to more than 2,000 gallons of water per minute during the drilling.

Currently only five dams are planned, four in Texas and one in New Mexico. The only dam built so far is the one in the C&L Draw, which was completed last year. Local Texas sponsors have since secured easements for the rest of their dams.

The sponsors of the Hitson, C&L, and Washburn Draws watershed project are the El Paso-Hudspeth Counties Soil and Water Conservation District (SWCD), the Hudspeth County Commissioner's Court, the Hudspeth County Underground Water Conservation District No. 1, and Dell City, Tex. The Cornudas, North, and Culp Draws watershed project covers parts of Texas and New Mexico. In addition to the same Texas sponsors, it is sponsored by the Otero County SWCD and the Otero County Commissioners in New Mexico.

There will be several fringe benefits in these watershed projects. The water stored in the limestone aquifer will be safe from the evaporative ravages of the arid setting above. The estimated 6,000 additional acre-feet of fresh water added to the ground water each year will reduce the annual net decline of the water in the aquifer and dilute its increasing salinity. Even a slight lessening in salinity will decrease the amount of water required per irrigation application and decrease the cost of desalinization of drinking water.

The energy savings caused by reducing the ground water's salinity become obvious over a long period of time. And slowing the rate of decline of the ground water table means additional future energy savings because irrigation pumps will not have to be lowered as quickly as they might otherwise have to be.

Not only will these watershed projects serve their primary objective of providing flood protection for the valley, but they will also provide for water and energy conservation.

Homer H. Logan,
geologist, SCS, Ft. Worth, Tex.

CONSERVATION Research Roundup

Extending the Aquaculture Season

Aquaculture in this country is primarily a summertime activity because cold winter water temperatures limit the growth rate or even kill several of the more productive species of fish. Fish farmers across the southern tier of States, however, might be able to improve on that situation with the use of transparent plastic covers, says a USDA Agricultural Research Service soil scientist.

Bruce A. Kimball of the U.S. Water Conservation Laboratory, Phoenix, Ariz., and George B. Brooks, who at the time of the study was an Arizona State University graduate student, used a greenhouse computer model to predict what would happen to the water temperature in a pond covered by plastic sheeting.

They found that a double layer of transparent sheeting suspended above the water surface could increase the water temperature by about 16 degrees Fahrenheit. "That temperature rise is enough to permit wintertime production in the southern States and the economics appear favorable for most growers," Kimball says.

"Even more economically attractive could be a nursery culture system where only a small fraction of the ponds are covered with plastic in the wintertime and densely stocked with fry. Then at the beginning of summer, the fry (now fingerlings) are dispersed to other ponds. This nursery system would extend the growing season by 2 to 3 months and should provide a large yield increase for little extra cost," he says.

For more information, contact Bruce A. Kimball, U.S. Water Conservation Laboratory, 4331 E. Broadway Rd., Phoenix, Ariz. 85040.

Reprinted from the January-February 1983 issue of *Agricultural Research*.

Conservation Tillage Changes Soil Test Results

Conservation tillage, despite its many virtues, has one drawback of particular interest to soil scientists. When a laboratory makes an organic matter soil test, its results are sometimes misleading due to the changes in soil composition that conservation tillage methods cause, says Theodore Peck, University of Illinois Extension soil scientist.

"While the term 'organic matter' is often equated with 'humus,' humus is not what soil tests today are measuring, as a direct result of conservation tillage," Peck says. "I'm in no way saying that reduced tillage practices are unfavorable. But while former cultural practices such as deep plowing, tilling, or mixing furthered the decomposition of residues by aerating the soil, conservation tillage practices do not aerate the soil because they simply do not mix the soil as much."

Because of conservation tillage, fragments of fresh plant residues are found in soil tested for organic matter, Peck explains. The fragments inflate the test values and cause variability of test levels.

Use of an organic matter test as a nitrogen soil test may be misleading and result in under-fertilization, Peck says. While it is true that a dark-colored soil (high in organic matter) will mineralize more available nitrogen than a light-colored soil (low in organic matter), it is also true that a dark-colored soil generally has a higher yield potential and so a higher nitrogen requirement. Soil testing to base nitrogen fertilization for Illinois field crops is not recommended in the same sense soil testing is recommended for basing lime, phosphorus, and potassium fertilization.

In special situations of strong indecision about the nitrogen supply available for the current corn crop, Peck says it may be useful to measure soluble nitrogen (nitrate and ammonium forms) in soil samples collected about June 1 (plus or minus 1 week) by depth increments to a depth of 3 feet. Special situations where this sampling might be considered are where fall applications of nitrogen were made or where large residual amounts of nitrogen might be expected and conditions for nitrogen loss during the winter and spring are high, he adds.

Peck says minimum field sampling recommendations are one composite soil sample for each 3 to 4 acres (11 composite samples per 40-acre unit) that represents the surface 6- to 8-inch layer (or depth of plowing). The idea is to map soil fertility patterns in a field.

"Detailed soil sampling studies have shown that changing field boundaries, cropping practices, and agricultural lime and fertilizer applications have masked soil fertility patterns in the surface-soil layer associated with soil-type differences," Peck concludes.

For more information, contact Theodore Peck, Department of Agronomy, University of Illinois, N-121 Turner Hall, Urbana, Ill. 61801.

Tillage and Soil Insects

Corn insect population sizes were quantified in long-term conventional and no-tillage corn treatments in a study at the Ohio Agricultural Research and Development Center (OARDC) of Ohio State University. Higher numbers of black cutworm larvae were found in the no-tillage systems, but the numbers were below the economic threshold for this species. In the same plots, the entomologists and agronomists found far greater numbers of earthworms in no-tillage than in conventionally plowed soil.

Another study at OARDC on no-tillage systems indicated lower numbers of corn rootworms in no-tillage than in the conventional tillage systems. This difference may be related to increased predator activity in the no-tillage systems.

For more information, contact the Ohio State University, Ohio Agricultural Research and Development Center, Wooster, Ohio 44691.

Stalk Borers in No-Till Corn

The common stalk borer is becoming an increasingly serious pest in no-tillage corn. The moths are attracted to grasses frequently found in no-till corn fields and the larvae damage young corn plants during May and June. Research entomologists at the Ohio Agricultural Research and Development Center found several available insecticides effective for controlling stalk borers if the chemicals are applied before the corn grows to no more than 8 inches tall. Scientists are now working out the relationship between the stalk borer and non-crop plants with which it is associated to find ways to manage the insect through habitat modification.

For more information, contact the Ohio State University, Ohio Agricultural Research and Development Center, Wooster, Ohio 44691.

Continuous No-Till

Growing crops continuously year after year without tillage does not harm soil biological activity, according to a study by the Ohio Agricultural Research and Development Center. The study was conducted on field plots where either no-tillage or conventional tillage crop production practices had been continuously followed for 18 years.

Because of the increase in no-tillage crop production requiring herbicides for control of weeds, there had been concern about long-term effect of chemicals on soil microorganisms.

Enzyme activities which indicate microbial activity within the soil were two to five times higher at the soil surface in the no-till plots than in those which had been conventionally tilled. Thus, continuous no-tillage for long periods of time does not significantly harm soil biological activity. No-tillage residues create a soil surface zone greatly enriched in humus, and evaporation is reduced by the mulch making a moist environment favoring soil microorganism growth.

For more information, contact the Ohio State University, Ohio Agricultural Research and Development Center, Wooster, Ohio 44691.

Establishing Vegetation on Toxic Spoilbanks

Certain combinations of lime, fertilizer, and mulch can produce acceptable vegetative cover of volunteer grasses and weeds for erosion control on relatively flat, toxic spoilbanks for at least 9 years without further treatment. But one treatment will not sustain seeded forage plants for that long.

Paul Sutton, a professor of agronomy at Ohio State University, has completed a 9-year study at a spoilbank in southeastern Ohio, on a site that had been strip mined in 1965 and graded in 1967. The strip mine law in effect at that time did not require burial of toxic materials and topsoil replacement. The area was barren and had a pH of 3.0, with very low levels of phosphorus and potassium.

Sutton designed two sets of plots, with nine plots repeated in each set. In November 1973, different combinations of lime, fertilizer, and mulch were added to eight plots in each set, leaving one plot in each set for control plots. There were three lime treatments (0, 6, and 12 tons per acre); three treatments of 15-15-15 fertilizer (0, 300, and 600 pounds per acre); and three hay mulch treatments (0, 1.5, and 3.0 tons per acre). The fertilizer was incorporated into the spoil to a depth of about 4 inches. Hay mulch was crimped into the spoil to prevent removal by wind.

In April 1974, the plots were broadcast seeded with a mixture of 'Kentucky 31' tall fescue, orchardgrass, and alsike clover.

In 1975, the vegetative cover on all plots ranged from 0 to 100 percent. By 1978, the lime had raised the pH of the top 4 inches of soil, ranging from 4.2 to 6.0, depending on the amount of lime and mulch added.

By 1981, all plots with no lime applied were bare. Also, when the pH dropped below 4.0, the spoil became toxic to plants. A sampling in 1982 showed that all the plots without lime had soil pH levels below 4.0. Even in the plots with lime added the pH had dropped to 4.4 or less.

The 1982 sampling also showed that in general, the cover on treated plots decreased from 1975 through 1982. Few of the original species planted remained in the 1982 stand. They were replaced by volunteer grasses and weeds found on very low fertility soils in the area—broomsedge, goldenrod, and blackberry briars. The few remaining Kentucky 31 fescue plants appeared to be very deficient in nitrogen.

Kentucky 31 fescue and orchardgrass require a soil pH of at least 4.5 for good growth. For legumes, the pH should be maintained above 6.0. The spoil became too acid to support the seeded plant species and the plant-available nitrogen was too low for growing grasses. Based on results from other tests on this spoil, potassium was also low. None of the plots would be acceptable for forage production.

In 1982, only two treatments (12 tons per acre of lime, 3 tons per acre of mulch, with no fertilizer and with 600 pounds of fertilizer per acre) produced acceptable cover for erosion control on slopes of less than 5 percent.

For more information, contact Paul Sutton at the Eastern Ohio Resource Development Center, Ohio State University, Caldwell, Ohio 43724.

Mulch Tillage for Corn

In a mulch tillage study at the Ohio Agricultural Research and Development Center of continuous corn on Wooster silt loam, yields averaged over a 4-year period were essentially the same. Although there were few if any statistically significant differences in yield, some trends may be indicated. No-till plots tended to yield more when the summers were dry and the chisel-plowed and sweep-tilled plots tended to yield more during wetter summers. In a previous study on Wooster

silt loam, tillage increased yields if sufficient plant residue was placed on the surface after tillage.

It may be in this study that the amount of tillage and plant residue remaining on the surface tended to balance each other. The amount of surface residue cover was reduced approximately 45 percent by the sweep tillage and 55 percent by the chisel plow. The chisel tillage treatments were approximately 9 inches deep and the sweeps ran approximately 6 inches deep.

A new tillage tool called paraplow is being included in the study this year. It appears this tool will leave more residue on the surface for improving rain water infiltration and reducing evaporation and erosion potential.

For more information, contact the Ohio State University, Ohio Agricultural Research and Development Center, Wooster, Ohio 44691.

New Alfalfa Will Boost Soil Productivity

USDA Agricultural Research Service (ARS) scientists are breeding varieties of alfalfa that produce nitrogen until the ground freezes, long after most other alfalfas have gone dormant.

A team of ARS and university scientists at St. Paul, Minn., is selecting for an alfalfa that can be used as an annual crop, provide feed for livestock, and leave 150 pounds of nitrogen an acre for the following year's corn crop when plowed down.

The scientists chose alfalfa because it is a popular legume, grown on nearly one-tenth of all U.S. cropland, and it is one of the most efficient legumes in fixing nitrogen for plant use.

In limited field tests to date, the added nitrogen from one selection, Mn BIC-7 (Minnesota Beltsville International Composite), converted to 11 percent more grain and 7 percent more fodder from corn grown after it than from corn grown on land planted to BIC-7, a widely used variety developed in the fifties by ARS Plant Geneticist Donald Barnes. The net returns from corn grown following Mn BIC-7 were 37 percent greater than those from corn grown on land fallowed the previous year.

The team of researchers now has several experimental lines of alfalfa designed for use as annuals and enough seed for testing. Last year, they established tests at four locations representing conditions prevalent in the Middle West.

Team member Gary Heichel, an ARS plant physiologist, says: "We're after a delicate balance required in an alfalfa grown as an annual in crop rotations. It must be suitable to growers as a forage for hay or silage during the cropping season. It must also have rapid regrowth after cropping, and enough nitrogen in the roots and crown to provide a net gain of nitrogen to the soil for use by the next crop."

Barnes, who is also on the research team, says the best balance so far was realized when Mn BIC-7 was grown to one-tenth bloom stage, harvested for hay, and allowed to grow until plowed under.

Another member of the team, University of Minnesota forage production scientist Craig Sheaffer, says: "That management system is fine for providing a net gain of available nitrogen in the soil, but it still may not be satisfactory to growers from a cost-benefit standpoint. Rainfall permitting, it may be more practical in Minnesota to take two cuttings, one in July and one early in September, and then plow under regrowth that occurs after the second cutting to about middle October. Selection for more fall growth provides a distinct advantage for alfalfa for use as an annual."

The new alfalfa, expected to be available to growers sometime in the late eighties, is potentially a very important tool for maintaining soil productivity. It could also provide vegetative cover for land that is now fallowed, plowed, and left idle for a year. Such a vegetative cover would help prevent water and wind erosion of exposed land.

For more information, contact Donald K. Barnes, Agronomy Building, Room 404, University of Minnesota, St. Paul, Minn. 55108.

Condensed from an article in the January-February 1983 issue of *Agricultural Research*.

A team of Federal and State scientists at St. Paul, Minn., is field-testing experimental strains of alfalfa as an annual forage crop. The new alfalfa could also be grown in some areas where land is now fallowed, plowed, and left idle for a year. Such a vegetative cover would help prevent water and wind erosion of exposed land.

Photo courtesy of USDA's Agricultural Research Service.

New Publications

1983 Fact Book of U.S. Agriculture

by the U.S. Department of Agriculture

This 125-page book is intended as a handy source of the main trends in agriculture for reporters, editorial writers, farm organization leaders, agribusiness managers, and others who speak and write about agriculture. The major subdivisions of the book are: farm production, income, and values; the farming operation; food marketing; agricultural services; and the rural social environment.

Also included in the book is an appendix containing tables and an agricultural term glossary.

Copies of this book are available for $4.75 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 001-000-04303-0).

Resource and Environmental Effects of U.S. Agriculture

by Pierre R. Crosson and Sterling Brubaker

This research paper is the culmination of several years of research undertaken at Resources for the Future. The authors analyze the trends which over the next several decades will determine the amount of pressure on the Nation's land and water resources, evaluate the resulting environmental impacts, and discuss the policy alternatives for dealing with them.

Copies of this publication are available for $15 from The Johns Hopkins University Press, Baltimore, Md. 21218 (ISBN 0-8018-2920-8).

Linkages Between Landownership and Rural Land

by Linda K. Lee

Using data from the 1977 National Resources Inventory and the 1978 Landownership Survey, this study analyzes linkages between rural landownership patterns and land use, land quality, and potential cropland. This study presents data classifying land use, land quality, and potential cropland by selected landownership categories to aid in the analysis of land use problems.

The information is presented in 13 pages of tables and text.

Copies of this report (No. PB83-139956), published by USDA's Economic Research Service, may be ordered from National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22161. Cost per paper copy is $7; cost per microfiche is $4.50.

Saving the Prairies: The Life Cycle of the Founding School of American Plant Ecology, 1895-1955

by Ronald C. Tobey

Specialists in the ecological sciences are most likely to profit from reading this work. As scientists at the University of Nebraska worked to assist ranchers and farmers, they came to view the grasslands as an organism progressing toward a climax. The author discusses the scientific and philosophical origins of ecology; the contributions of C.E. Bessey, Roscoe Pound, Frederic Clements, and John E. Weaver; and other centers of ecology at the University of Chicago and in Europe.

The persistent drought of the thirties undermined some of the Nebraska school's assumptions about progress to the climax and the limited influence of humans. The drought drew them into the effort with the Soil Conservation Service and other parties to restore and maintain the grasslands. Several SCS range specialists and current range management ideas came out of the grassland school of ecology.

Copies are available for $25 (plus $1.50 shipping and handling) from University of California Press, 2223 Fulton Street, Berkeley, Calif. 94720.

Review by Doug Helms, historian, Public Information, SCS, Washington, D.C., and Thomas Shiflet, director, Ecological Sciences, SCS, Washington, D.C.

Microelectronics in Agriculture and Horticulture

by S. W. R. Cox

With the emergence and development of microelectronics devices over the past decade that have changed the way in which we do many things at our work and in our social and domestic lives, the agricultural and horticultural communities will be affected probably as much as any sector of the population. The author of this book provides an introduction first to electronic instrumentation and then to microelectronics itself—what it is and what it does—and its existing uses in agriculture and horticulture, plus likely developments in the technology and its applications in the future.

Some of the subjects covered in this book in relation to future applications of microelectronics devices are: field crops; protected crops; crop handling, processing, and storage; cattle; and computers in farm management.

Copies of this book are available for $24.50 from Allanheld, Osmun, and Co. Publishers, 81 Adams Drive, Totowa, N.J. 07512.

Cost Data for Landscape Construction, 1983

by Kerr Associates, Inc.

The fourth edition of this publication contains 272 pages of current unit prices to help designers and contractors solve the special estimating problems associated with site and landscape development. Construction divisions covered include: demolition, site preparation, earthwork, drainage, site improvement, planting, surfacing, concrete, masonry, metal, carpentry, and lighting. Costs are presented in terms of both general "composite costs" for quick preliminary estimates, and specific "basic costs" for detailed final estimates. New for this edition is a section on architectural fountains.

All instructions necessary for an accurate cost estimate are included: job review; quantity take-off; unit prices; price adjustment; mobilization costs; and summation. In addition, 18 appendixes bring together useful formulas and data to aid the estimator.

Copies of this publication are available for $27.50 (plus $1.25 for postage and handling) from Kerr Associates, Inc., Suite 100, 1942 Irving Avenue South, Minneapolis, Minn. 55403.

Recent Soil Surveys Published

by the Soil Conservation Service

Indiana: Decatur County and Wabash County.
Kansas: Clark County.
Louisiana: Jefferson Parish.
Mississippi: Pearl River County.
South Dakota: Bon Homme County.
Texas: Williamson County.

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